not; right or left handedness; the number of hours of sleep and the time of going to bed; whether dreams are frequent, sleep is deep, and so on.

The pathological section aims to record any serious diseases, and especially of the nervous system, through which the person has passed; the disease of which he died, if the record is of a deceased person; the number and sex of his children, and the periods of their birth; the occurrence of congenital defects, and whether they were transmitted to the offspring, and so on. The moral characteristics are more difficult to describe: the plan here followed is to give the recorder the choice between opposite epithets, and at times to include a neutral group. Is the temper of the subject of inquiry joyous, sad, or changeable; calm, or violent? Is he independent in his opinions, or easily led by others? Is he vain, or modest; remarkably truth-loving, or weak in this respect; credulous, or suspecting; selfish, or generous; harsh, or gentle; timid in society, or bold; aggressive in his opinions, or mild? Has he any special talent for music, poetry, the fine arts, science, etc.? Has he pronounced religious sentiments? Is he active, regular in his habits, or sluggish and fitful? Is he intellectually inclined, miserly, or spendthrifty, materialistic, or not? Such is the range of inquiry included in this scheme. The intellectual traits are of a similar nature. The maximum of intellectual work, the manner of working, the nature of the occupations; the strength of the attention, of his logical powers, of his imagination, of his insight, of his memory (and in particular of memory for forms, places, dates, numbers, names, tunes, prose, or verse), of his generalizing power, his classifying talents, and the scope of his mental tension; the soundness of his judgment, the ease of speech, the degree of precocity — these form the last of the group of questions. Throughout, any characteristic specially hereditary, either from the parents to the subject of the description, from the latter to his children, or in a collateral branch of the family, is to be especially noted as such.

To accurately fill out such a blank is by no means an easy matter; it is only of one's most intimate friends (one's family and kindred) that any thing like a complete list can be hoped for. The society does well in asking that where no definite answer is possible the question should be left unanswered; they do not want mere guesses, or phrases that say nothing. M. de Candolle, who has been influential in arranging this list, is much at home in this field of research; and in his seventy-ninth year states that there are thirty-one persons about whom he would be willing to draw up such records. This is an unusual number, and the average scientific observer is doing well if he can furnish ten such records. But even at this rate the society has good opportunities of contributing a valuable addendum to our information on the heredity of mental traits. It would be easy to criticise many points in the arrangement of the questions, and point out omissions and ambiguities, but the main point is the manner in which such answers are used: after the results of this inquiry are published, such criticism will be serviceable in making the next inquiry more thorough and valuable than this.

Recent writers have called attention to the important step in human evolution that occurs when the principles of development pass from the stage of being unconsciously intuited and uncertainly followed, to the stage when they are explicity expressed and purposely aided. If, as many believe, the future of the race is largely in our hands, the knowledge that such researches as those here noticed will furnish, must form the groundwork on which conscious and scientifically-conducted advance will be based.

THE DUCK'S BRAIN. — It is well known that the destruction of the cerebral hemispheres of a bird's brain reduces the animal to a mere automaton. While the functions are all capable of action, all spontaneity is gone. It is a 'sleep without dreams.' M. Ch. Richet has recently called attention to the change in these appearances when only *a portion* of the cerebrum is injured. He uses ducks because the division of their brain is more distinct and the animal less liable to fatal injury by the operation than in pigeons. Only such animals are included in the observation as have recovered from the injuries of the operation. In order to detect the absence of a function as a result of the cerebral lesion, one must know the normal functions of the duck. In the language of the duck, M. Richet detects six cries, associated with pain or fright, with being separated from a companion, with the recognition of a companion, with joy, with taking food, and with being chased by a dog. Add to this the actions occurring in attracting one another and the list is about complete. M. Richet finds that a duck whose cerebrum is partly destroyed acts exactly as a normal duck: an accurate observer could probably not tell which is which. The only difference that was found is this: when a normal duck is driven into a corner, it tries to escape by going to the side of the pursuer; a duck with an injured cerebrum huddles against the wall, and makes no such attempt. M. Richet thinks that this method of escape is really the only intelligent act a duck performs, and that the injury of the cerebrum has thus impaired the highest function; all the rest of a duck's actions are almost entirely automatic, and are performed by lower centres. The experiments accent the importance of correlating the effect of a lesion with the normal intelligence of the animal acted upon.

BOOK-REVIEWS.

On the Relation of the Laramie Molluscan Fauna to that of the Succeeding Fresh-Water Eocene and other Groups. By CHARLES A. WHITE. (U. S. Geol. Surv., Bull. No. 34.) Washington, Government. 8°.

ALTHOUGH it is not distinctly indicated in the title, this is really an important contribution to Eocene paleontology. Twenty-six invertebrate species from the Wasatch group, or lowest division of the fresh-water Eocene beds of Utah, are described and figured. The stratigraphic and geographic range of each species is presented in a table, which Dr. White has made the basis of some important conclusions concerning the relations of the Cretaceous, Laramie, and Eocene strata.

The intimate stratigraphical relation of the Laramie group to the marine Cretaceous series beneath it has been recognized by every field geologist who has studied those strata, and it is this fact, in addition to the discovery of dinosaurian remains in the Laramie, that has led them to range that group as a member of the Cretaceous series. While there seems no reason to doubt that sedimentation was continuous, not only through the marine Cretaceous series, but also from that series into and through the Laramie, it is true that there was at the beginning of the Laramie period a comparatively sudden change in the character of the previously existing molluscan fauna over the whole area which was then occupied by the Laramie waters; that is, at a certain horizon in the unbroken succession of strata there is an abrupt disappearance of all distinctively marine forms, and an equally abrupt accession of brackish-water and fresh-water forms which continue through the whole Laramie group.

On the other hand, similar evidence of continuous sedimentation from the Laramie into the Wasatch group has not hitherto been publicly announced. And wherever later strata have been discovered resting upon those of the Laramie group they have been found to be free from all fossil forms which can be reasonably referred to even a slightly saline habitat, while the Laramie strata contain many brackish-water forms throughout their vertical range.

But Dr. White has been able to show that such unconformities as exist between the Laramie and Wasatch groups are local and unimportant. And, starting with the hope that, although the physical changes attending the deposition of the last of the Laramie beds resulted in the extinction of all the brackish-water mollusca of that group, certain of the fresh-water species would yet be found to have continued their existence into the Wasatch epoch, he has proved that this is actually the case.

In other words, we seem to have conclusive proof that there is a complete and unbroken stratigraphical series in that western region, extending from the Middle Cretaceous to the top of the Eocene, and aggregating nearly or quite two miles in thickness. A remarkable fact connected with the production of this great series is that, while sedimentation was evidently not materially interrupted in at least a large part of the area within which those deposits are now found, the aqueous life was changed first from that of a purely marine character to that of alternating brackish and fresh waters, and finally to that of a purely fresh-water character; that is, the waters in which this series of strata were deposited were first

marine, then alternating brackish and fresh, and finally wholly fresh. This, of course, implies the occurrence of great physical changes upon the North American continent during the Cretaceous and Eocene periods, which, however, did not interrupt sedimentation in a large part of its interior.

Dr. White has also done stratigraphic geology an important service in his concluding remarks upon the value of fresh-water fossils in geological determinations.

"The differentiation of the mollusca into generic, family, and ordinal groups, and the diversification of specific forms among these groups, are immensely greater in marine waters than in any other. In brackish waters it is much less than in the open marine, and in lacustrine waters the minimum of differentiation is found. The large collections of fossil mollusca which have been made in different parts of the world indicate that this slight tendency to differentiation among fresh-water mollusca has always obtained in past geological time; also, that types once established have persisted through a long series of geological periods. Therefore it has become known that fossils of fresh-water origin are of little value, compared with those of marine origin, as indices of the true geological age of the strata containing them. In consequence of this, the real value of fresh-water fossils as aids in the study of stratigraphical geology has been underestimated. While it is admitted that these fresh-water forms are of little value in determining the geological age of strata, they are really of as great importance in the study of local, and even of continental, geology as are any other fossils. Indeed, it would be quite impracticable to ascertain whether the waters in which formations have been deposited were marine, brackish, or fresh, except by the character of the contained fossils.

"Fresh-water formations of considerable extent can only be produced upon continental areas, and they consequently record phases of continental history of which marine formations give no indication. In western North America the fresh-water deposits rival in extent and thickness the great marine formations; and it would have been impossible to arrive at the knowledge of them which we have now attained except by a study of their fossils. Each of these great lacustrine formations has its own distinguishing fauna, the uniform character of which over great areas is quite remarkable. So large has been the area of some of the fresh-water seas in which these deposits were formed, and so uniform the conditions under which they existed, that the geographical distribution of species in them has been nearly or quite as great as the average of that of marine mollusca. For example, some of the species of the Laramie group have been found at points more than a thousand miles apart; and in the fresh-water Eocene groups the molluscan fauna is practically identical at points as much as 200 miles apart."

The Margin of Profits. By EDWARD ATKINSON. New York, Putnam. 12°.

MR. ATKINSON'S writings on practical economy are among the best that we have. They are always interesting and suggestive, and frequently contain information and advice of much value to those for whom they are intended. They are not original in a scientific sense, and do not profess to be, Mr. Atkinson being a man of business rather than of science; yet all his arguments rest on a scientific basis, and on carefully collected statistics. He is, moreover, in hearty sympathy with the toiling poor in their efforts to improve their condition in life — indeed, most of his writings are inspired by this motive; yet he freely criticises them when he thinks their efforts are in the wrong direction.

The book now before us contains an address delivered before the Central Labor Lyceum of Boston, together with a reply made on the same occasion by Mr. E. M. Chamberlin, and Mr. Atkinson's rejoinder to the same. The special object of the work is to show, first, that the margin of profits, that is, the share of the capitalist in the products of industry, is much smaller than workingmen generally suppose; and second, that the progress of industry and the increase of capital, while benefitting the capitalist, of course, benefits the laborer far more. To prove and illustrate the first of these propositions, he cites the example of the cotton manufacture, in which the amount of capital used is larger in proportion to the product than in any other industry; so that here, if anywhere, we might expect the profits to be unusually large. Yet, according to Mr. Atkinson, who is thoroughly informed in the matter, the profits are but a very small portion of the cost of the goods. He says: "When you buy 40 yards of cotton cloth at $2.50, you pay the owner of the mill 15 cents profit, but you also pay about 15 cents more to other people for profit; that is, 30 cents profit in all; and you pay $2.20 directly for labor" (p. 28). This statement he proves by an analysis of the process of production, illustrating the same by a chart.

He then goes on to show how greatly the working classes have gained by the improvements that have taken place in production and the consequent increase of capital. He gives it as his opinion, and economists generally hold the same view, that "there has never been a period in the history of the world in which there have been so many important new inventions or so many applications of previous inventions, all tending to human welfare, as in the last twenty-five years" (p. 109). And these improvements, though at first chiefly beneficial to the few, are now, he thinks, tending rapidly and largely to the benefit of the many. He cites some statistics showing that during the past twenty-five years the cost of living has been greatly reduced, while the wages of workmen have largely increased.

Mr. Chamberlin's reply to Mr. Atkinson is very feeble indeed, not one of his opponent's arguments being met, nor any new ones of value advanced. That Mr. Atkinson's views are in the main sound there can be no doubt; yet the scientific relations of capital and labor are not yet thoroughly understood, and until they are we cannot tell precisely how improvements in production and increase of capital affect the different portions of society. Mr. Atkinson is doing important service, however, in calling attention to the service rendered to society by capitalists, inventors, and other brain-workers, and which laboring men are liable to overlook or underestimate. He gives also valuable hints on the subject of personal and domestic expenditure, showing that the poorer classes might save much more than they now do without diminishing their present enjoyment in the least. The whole book, in fact, though containing little that is new of a scientific character, cannot fail to be of use to workingmen, as well as to all others who are studying the labor question from a practical point of view.

Die Klimate der Erde. Von Dr. A. WOEIKOF. 2 vols. Jena, Costenoble. 8°.

DR. WOEIKOF, professor of physical geography in the University of St. Petersburg, is well known to American meteorologists as the author of the general explanatory essay in Professor Coffin's 'Winds of the Globe,' published after the death of the latter by the Smithsonian Institution. He has also been a frequent contributor to the Austrian and German meteorological journals and to other scientific periodicals outside of Russia, and his essays on the climate of the glacial period have attracted much attention from geologists. He has travelled and observed widely abroad, as well as read exhaustively at home. Students of physical geography are therefore to be congratulated that he has condensed the results of his labors in a general work on the climates of the earth, and also that an authorized German translation of the Russian original has appeared; for it is a positive loss to science when an experience as wide and well trained as Dr. Woeikof's is not recorded as far as may be in transmissible form.

The first volume of the work includes a series of chapters on matters of general importance, several of which have been republished elsewhere, so agreeable are they in style and treatment. The chief headings are, 'Pressure and Winds, including a Consideration of Temperature Changes in Vertical Currents;' 'Atmospheric Moisture and Precipitation;' 'Influence of Snow and Ice on Climate;' 'Temperature of Bodies of Water and their Climatic Influences;' 'Daily Variations of Temperature, Moisture, and Wind;' 'Variation of Temperature with Altitude, with Particular Regard to the Effect of Topographic Form on Temperature Changes;' 'Effect of Climate on Vegetation and of Vegetation on Climate;' 'General Statement of the Distribution of Temperature and Pressure over the Earth.' There is nothing of text-book style in these chapters: they are rather essays than lessons, fit for reading by the well-informed meteorologist rather than for study in